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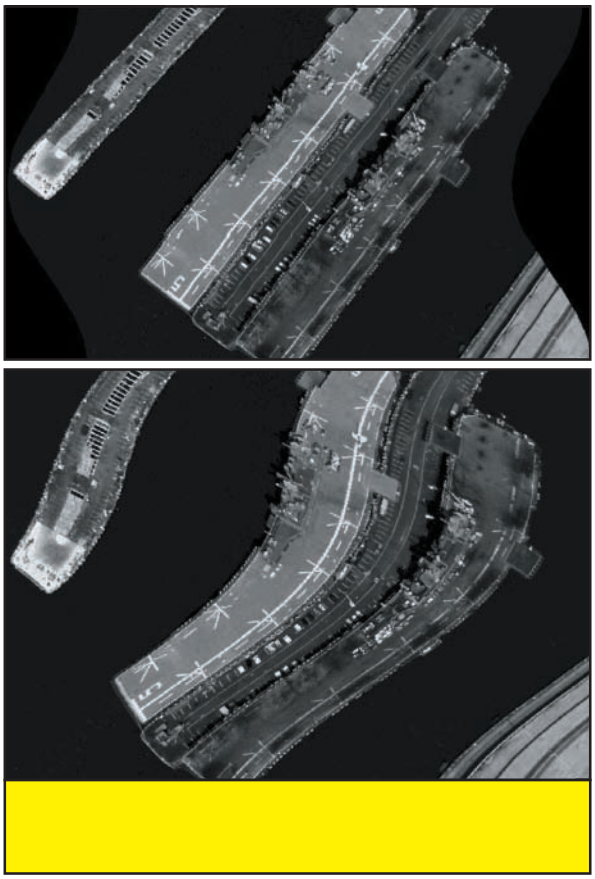
*Science and Technology for Tomorrow's Aerospace Forces*

## *Success Story*

# AUTOMATED MOTION-COMPENSATION AND SEMI-AUTOMATED RESTORATION TECHNIQUES



Unavoidable variations in aircraft speed, direction, altitude, and orientation introduce distortions, which reduce the usefulness of electro-optical (EO) and hyperspectral imagery acquired from line-scan sensors. The Sensors Directorate developed automated motion-compensation and semi-automated techniques that restore distorted images caused by failure of camera stabilizers, incomplete data due to sensor failure, or unavailable geographic reference and navigation data.

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## Accomplishment

Directorate engineers developed automated motion-compensation and semi-automated restoration techniques that greatly reduce distortions with line-scan images caused by variations in the motion and orientation of sensor platforms. Directorate engineers successfully demonstrated these techniques on highly distorted, high-resolution EO infrared sensor and hyperspectral sensor images.

## Background

Images acquired from aircraft-mounted line-scan sensors are subject to distortions caused by changes in platform speed, direction, orientation, or altitude. Even with camera stabilizers, aircraft movements create distortions in line scans. These distortions can reduce the ability to identify characteristics of objects or make the objects completely unrecognizable. For example, when an aircraft begins scanning a building at one altitude, then climbs to a higher altitude before completing the scan, the width of the building appears to become progressively narrower over its length.

Directorate engineers achieved a compensated image for the EO imagery on highly distorted images by applying a matched filter to each line. For hyperspectral imagery, the directorate completed an optimally matched filter from selected frequency bands, then propagated it through the other frequencies. The engineers successfully demonstrated the line scan-matched filter even when camera stabilizers failed, when no geographic reference or available navigation data existed, and when sensor failure resulted in incomplete data.

Sensors
Emerging Technologies

## Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTT, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (01-SN-07)